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ABSTRACT

Depression has been linked to cognitive deficits and learned helplessness models in various theories. To examine depression effects on abstract problem solving ability and the relationship between intelligence and anxiety, 66 of 303 college students (23 male, 43 female), evidencing least and most depressed states as assessed by the Beck Depression Inventory, completed the Block Design and Vocabulary subtests of the Wechsler Adult Intelligence Scale (WAIS) and the Taylor Manifest Anxiety Scale. An analysis of the results showed no significant differences between the two groups. The Block Design performance of the most depressed group did not differ significantly from that of the least depressed subjects either before or after covarying for anxiety and intelligence on abstract problem solving performance or for response latencies. A discriminant function analysis found that sex, response latency, and intelligence contributed most to discriminating between the groups. Specifically, females, individuals who took less time to complete the Block Design tasks, and individuals with a lower intelligence were most likely to be depressed. (BL)

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Depression and Abstract Problem Solving Ability

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Abstract

This study investigated the relationship between depression and abstract problem solving ability. Of 303 college students administered the Beck Depression Inventory (BDI) and an IQ measure, 66 were classified into Most and Least Depressed groups. An anxiety measure and the WAIS Block Design Subtest (the abstraction measure) were administered. No significant differences were found between groups after covarying for anxiety and IQ on abstract problem solving performance or response latencies. A Discriminant Function Analysis found Sex, Response Latency, and IQ contributed most to discriminating between groups. The classification procedure successfully classified 66.67% of the total cases and 77.4% of the Most Depressed.

Depression and Abstract Problem Solving Ability

Numerous psychological theories of depression have been posited; the two more testable and relevant theories (Beck, 1967; Seligman, 1974) are of particular importance because they provide a framework to facilitate understanding the associated deficits. Beck suggests that individuals experience depression because of a thinking (cognitive) deficit rather than a mood disturbance. Support for this theory has been mixed (Friedman, 1964; Loeb, Beck, Feshbach, & Wolf, 1964; Miller, 1974).

Seligman (1974) postulated a learned helplessness model of depression. Thus, depressives perceive reinforcement as response independent and, as a result, cognitive and motivational deficits occur. Seligman's (1974, 1975) studies of learned helplessness suggest that nondepressed students exposed to a helplessness induction procedure and mildly depressed students who had not been exposed to the helplessness induction procedure had abstract problem-solving (anagram response patterns) of longer mean response latencies and a greater number of learning trials. Seligman indicates that learned helplessness underlies depression.

Because the anagram task is a unilevel task, the helplessness model needs to be further investigated to determine whether moderately severe depressed college students would reflect deficits on a multilevel, nonverbal abstract problem solving task.

The present study examined the performance of both Least and Most Depressed students' abstract problem-solving ability using a multilevel,

nonverbal, abstract task (Block Design Subtest from the WAIS) and also measured the relationship between IQ and Anxiety to their performance by administering the Clarke Institute of Psychiatry version of the Vocabulary subscale of the Wechsler Adult Intelligence Scale (Paitich & Crawford, 1971) and the Taylor Manifest Anxiety Scale (MAS).

Method

Subjects

The subjects who participated in this study were 23 male and 43 female students enrolled in an urban community college in Michigan. The subjects ranged in age from 17 to 60 years, with a mean age of 26.6 years. The sample included 39 freshmen, 22 sophomores, four juniors, and one senior and was comprised of 51 Blacks and 15 Caucasians.

The 66 subjects were selected from a pool of 303 students taking liberal arts classes in the Winter of 1980 and were tested between April 7 - 15, 1980.

Procedure

Two trained experimenters administered the Clarke-WAIS Vocabulary Test and the Beck Depression Inventory to 303 students. Based on BDI scores, the students were classified into two groups for follow-up testing. The groups were selected using whole number raw scores to establish the upper and lower 15% (Most and Least Depressed) of the sample and comprised the following:

1. Least Depressed (scores ranged from 0-2 points, N = 35)
2. Most Depressed (scores ranged from 16-40 points, N = 31)

Prior to administration of the follow-up tests, each of the 66

subjects was informed of random selection for administration of two ten-minute tasks. Groups of 8 to 15 subjects were administered the Taylor Manifest Anxiety Scale and then individually administered the Block Design Task by one of four trained examiners.

Hypotheses: There will be no significant difference between the abstract problem-solving ability on Total Block Design Raw Scores, Easy Block Design tasks (Block Design Numbers 1-6), Difficult Block Design tasks (Block Design Numbers 7-10) or Mean Response Latency time to solve attempted Block Designs between Most and Least Depressed groups when controlling for the variables of IQ and Anxiety.

Results

Block Design Performance and Depression

The results of *t*-tests and analysis of covariance failed to reveal significant group differences. The Block Design performance of the Most Depressed group (Moderate - severe range) did not differ significantly from that of the Least Depressed subjects either before or after co-varying for anxiety and IQ on Total Block Designs, Easy Block Designs or Difficult Block Designs.

Further, there were no significant differences between Most and Least Depressed groups on Mean Response Latency time to solve the attempted Block Designs before or after covarying for Anxiety and IQ. These findings are inconsistent with the predictions made by the learned helplessness model of depression.

Relationship Between IQ and Anxiety in Block Design Performance

On Total Block Design Performance, with the F Ratio of .14, d.f. = 1.62, $p > .71$, the covariate of IQ appears to have a significant relationship with performance on Total Block Design Scores, F = 4.79, d.f. = 1.62, $p < .03$. Similarly, on the Easy Block Design Task, the F ratio of .009, d.f. = 1,62, $p > .92$, indicates there is no significant difference between Most and Least Depressed after adjusting for the effects of IQ and Anxiety.

Discriminant Analysis

The dependent variable was depression (Most or Least Depressed) for the discriminant analysis. The 11 independent variables were, in order: IQ, Race, Block Design Total Score, Block Design Easy, Block Design Difficult, Marital Status, Education, Mean Response Latency, Sex, Anxiety Raw Scores, and Age. of 66 cases processed, eight cases were excluded from the analysis because of one or more missing discriminating variables. Thus, 58 cases were used in the Discriminant Analysis with 27 subjects in the Most Depressed Group and 31 subjects in the Least Depressed Group.

Of the 11 variables, the three variables which account for the most information to discriminate among the groups were: Sex, Mean Response Latency, and IQ, all significant predictors at the .05 level. Therefore, knowledge of these three variables acting together are moderate predictors of membership in Most Depressed or Least Depressed groups. Thus, females are more likely to be depressed; individuals who take less time to complete the Block Design Tasks are more likely to be depressed, and

individuals with a lower IQ are most likely to be depressed.

With one discriminant function, there was a moderate canonical correlation of .40, indicating that .16 of the variance was accounted for on the dependent measure, i.e., predicting group membership (Most Depressed or Least Depressed).

Table 1 presents the results for classification for the Discriminant Analysis for 66 cases. As indicated in Table 1, 66.76% of the 66 cases were correctly classified with 77.4% of the cases in the Most Depressed group correctly classified. Thus, the highest percentage of successful classifications was in predicting group membership for the Most Depressed group.

Insert Table 1 about here

Discussion

It was expected that significant differences would be found between Most and Least Depressed groups on the abstract problem solving task. Beck's cognitive model of an abstraction deficit with depression predicted that the Least Depressed would perform significantly higher than the Most Depressed on abstract tasks. However, he used a verbal task and his sample was psychotically depressed. Other research findings relating to cognitive deficits with depressives were mixed. The present findings supported earlier research (Gotlib, 1977) regarding no significant performance deficits between moderate depressed and nondepressed on impersonal, abstract tasks.

It was expected that there would not be significant performance differences between groups on Easy Block Design Tasks before or after covarying for IQ and Anxiety because anxiety scores were similar between groups and anxiety does not interfere on easy tasks as it does on difficult tasks. In addition, the easy tasks should easily be completed by individuals with an IQ of either 97 or 102.

The findings supported previous research (Miller, 1975; Friedman, 1964) which indicated no performance deficits for depressives on easy tasks. It was expected that significant performance differences would be found between groups on difficult tasks. Although previous depression research has been mixed, certain researchers (cf., Benson & Kennelly, 1976; Gatchel & Proctor, 1976; Gotlib, 1977) substantiated the present firdings, while others (cf., Braff & Beck, 1974; Granick, 1963) contradicted the present findings. Explanations for contradictory findings may be task and sample-related.

Although the present sample represented a greater mean BDI score difference between depression groups than previous research on college populations, the present sample mean of the Most Depressed group was in the moderate-severe depression category according to Beck's classification system.

It was predicted from Seligman's (1974) learned helplessness model of depression that the Mean Response Latency for the Most Depressed would be significantly <u>longer</u> than for the Least Depressed group. Anagram tasks used in previous research did not differentiate easy versus difficult tasks, nor were anagrams multilevels of task difficulty.

The present research findings were consistent with Benson and Kennelly (1976) and Gotlib (1977) and failed to replicate Seligman and his associates' findings. Therefore, using this abstract problem solving task, both the Most and Least Depressed subjects performed similarly to Seligman's nondepressed subjects on Mean Response Latency.

Neither anxiety nor IQ had an effect on Mean Response Latency. Gotlib's (1977) research indicated that low trait anxiety was unrelated to Mean Response Latency. The paucity of research with depressives focusing on the effects of high trait anxiety and IQ on Mean Response Latency make any conclusions difficult to support by previous research.

Discriminant Analysis

One discriminant function explained .16 of the variance on the dependent measure. The three variables having the greatest weight in the discriminant function analysis were the variables of Sex, Mean Response Latency, and IQ. Females were significantly more likely to be depressed than males.

The Discriminant Analysis indicates that females maximally discriminate on the Most Depressed group, individuals with shorter Mean Response Latency discriminate on the Most Depressed group, and individuals with lower IQ's maximally discriminate on the Most Depressed group. Thus, future research could consider how these variables, in particular, are related to depression.

It is apparent that there is a need to conduct subsequent research and to develop other models to further clarify the relationship between problem-solving and depression.

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Table 1

Classification Results for Discriminant Analysis

on Predicting Group Membership

Actual Group	No. of Cases	Predicted Group Membership	
		0	1
Group 0		24	7
Most Depressed	31	77.4%	22.6%
Group 1		15	20
Least Depressed	35	42.9%	57.1%

Note. Percent of "Grouped" cases correctly classifed: 66.67%

Note. N = 66.